Initial Analysis of the Impacts of a Farm Savings Account Program on Price Volatility

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Background

In a recently released report on the impacts of three programs to mitigate price volatility (Nicholson and Stephenson, 2010), programs were analyzed as proposed by their sponsoring organizations. An alternative option proposed to address this issue is Farm Savings Accounts (FSA). In its simplest form, the FSA would be a voluntary program that allows to defer income from taxation in more profitable years and withdraw income in less profitable years. Government could provide matching funding to encourage participation.

Methods

The modeling approach used to develop this analysis is described in detail in Nicholson and Stephenson (2010). A number of assumptions are necessary about the nature of an FSA, about government matching (and payment limits) and participation behavior by dairy farmers. These assumptions include:

- Farms are assumed to contribute a proportion (parameterized in the model) of the difference between current Net Farm Operating Income (NFOI) and a 3-year rolling average of NFOI, when positive. This contribution is assumed made monthly, based on difference with the year prior. It is assumed not influenced by the government match amount. A range of values for this proportional contribution is considered.

- Farms use NFOI net of contributions as the indicator of profitability for production decisions when contributions are made, but consider NFOI with withdraws when funds are being withdrawn. Essentially, this is an assumption that says "out of sight, out of mind" for contributions.

- Government matching contributions are 1:1 up to $10,000/farm/year. Above that, up to $40,000/farm/year, government matches at $1 for every $4 of farmer money.

- Farms earning more than $750,000 per year in NFOI are not eligible for government matching. A proportion of farms eligible to receive matching based on a $750,000 NFOI is adjusted using current NFOI. Base values for the proportion of farms eligible for matching based on our starting values for NFOI for four farm size categories are initially estimated as Small=1, Medium=1, Large=0.75, Extra Large=0.2.

- Farms can withdraw amounts equal to the difference between current NFOI and a 3-year rolling average, when negative, subject to the limit on available funds (which includes government matching)

- No adjustments are made for differences in tax rates on contributed and withdrawn funds.

- All scenarios assume elimination of MILC and DPPSP in 2012.

Analyses

The analyses assume either no major shocks to the U.S. dairy industry during 2012 to 2018, or given significant shocks to feed costs (in 2015), and to export demand (increase in 2016, decrease in 2017). We then examined the impacts of programs on the All-Milk price, variation in milk price, quantity of milk marketed the pattern of government expenditures, and annual milk income less feed costs for small-size (37 cow) medium-size (183-cow) farms with and without the FSA program. We also undertake sensitivity analyses to explore the importance of the assumption about proportional contributions by dairy farmers for the observed outcomes.

Results

The results of these analyses are presented primarily as annotated figures. Additional information may be made available upon request. However, a few general conclusions can be drawn from these analyses:

- Conditional on the behavioral assumptions, the FSA idea does have some impact on our absolute deviation indicator of variation. For the scenarios with a major shock, the reduction is comparable to the reduction observed for other proposed programs such as Costa Sanders, Marginal Milk Pricing or Foundation for the Future.

- A higher proportion contributed by farmers means greater effectiveness at reducing volatility, but higher government costs.

- To stay within a $700 million amount for the farm bill, assuming 50% proportional contributions by farmers, the amount for one to one matching would need to be lower than that assumed above, about $2500/farm/year, with $1 for $4 matching up to only about $20,000/farm/year.

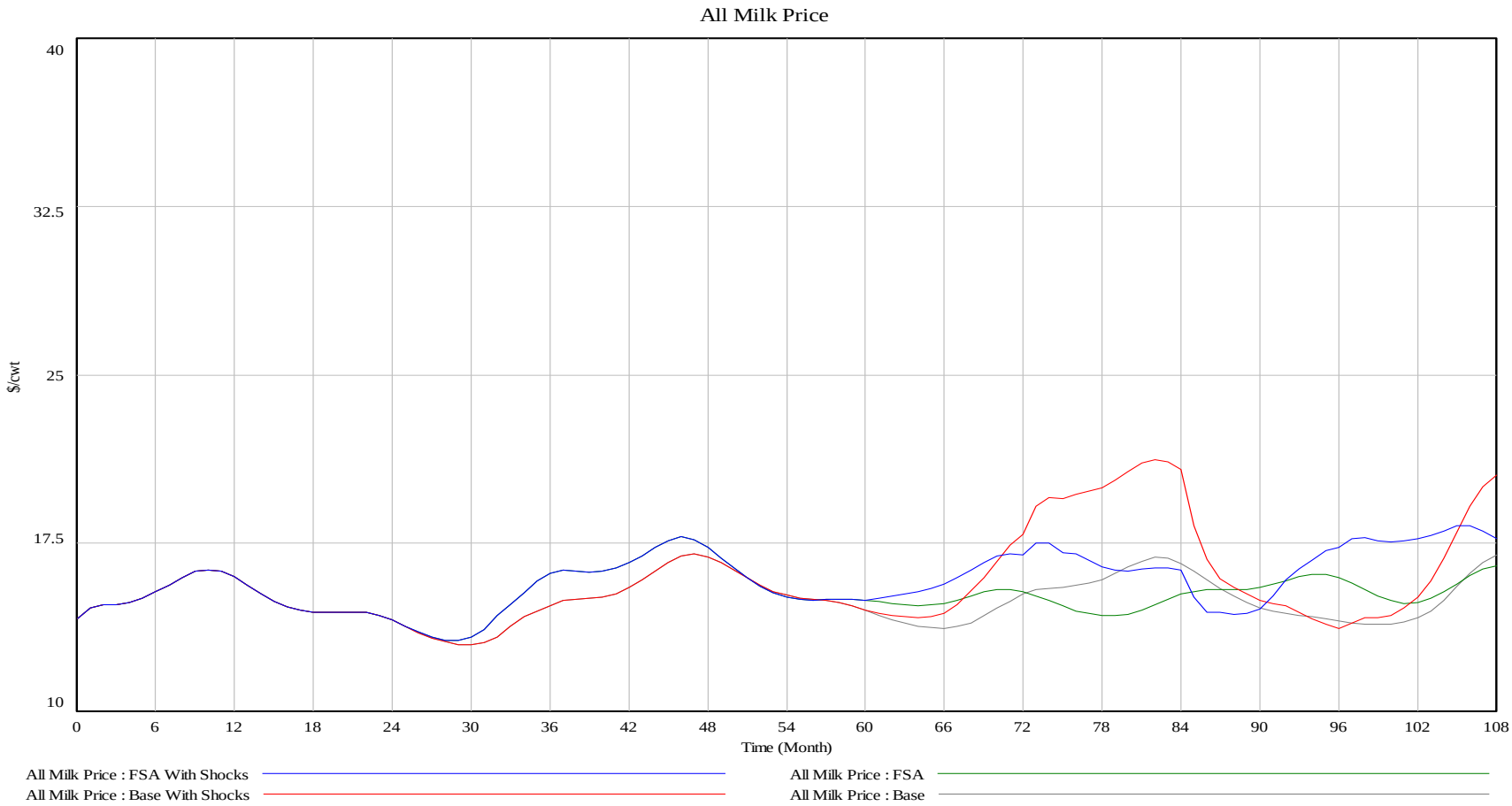

Figure 1. All Milk price from 2010 (time 0) to 2018 (time 108) for a Baseline scenario with and without shocks and with a Farm Savings Account assuming 75% contribution by dairy farmers in each of four size categories. Given these assumptions, the FSA reduces the increase in prices in response to significant shocks.

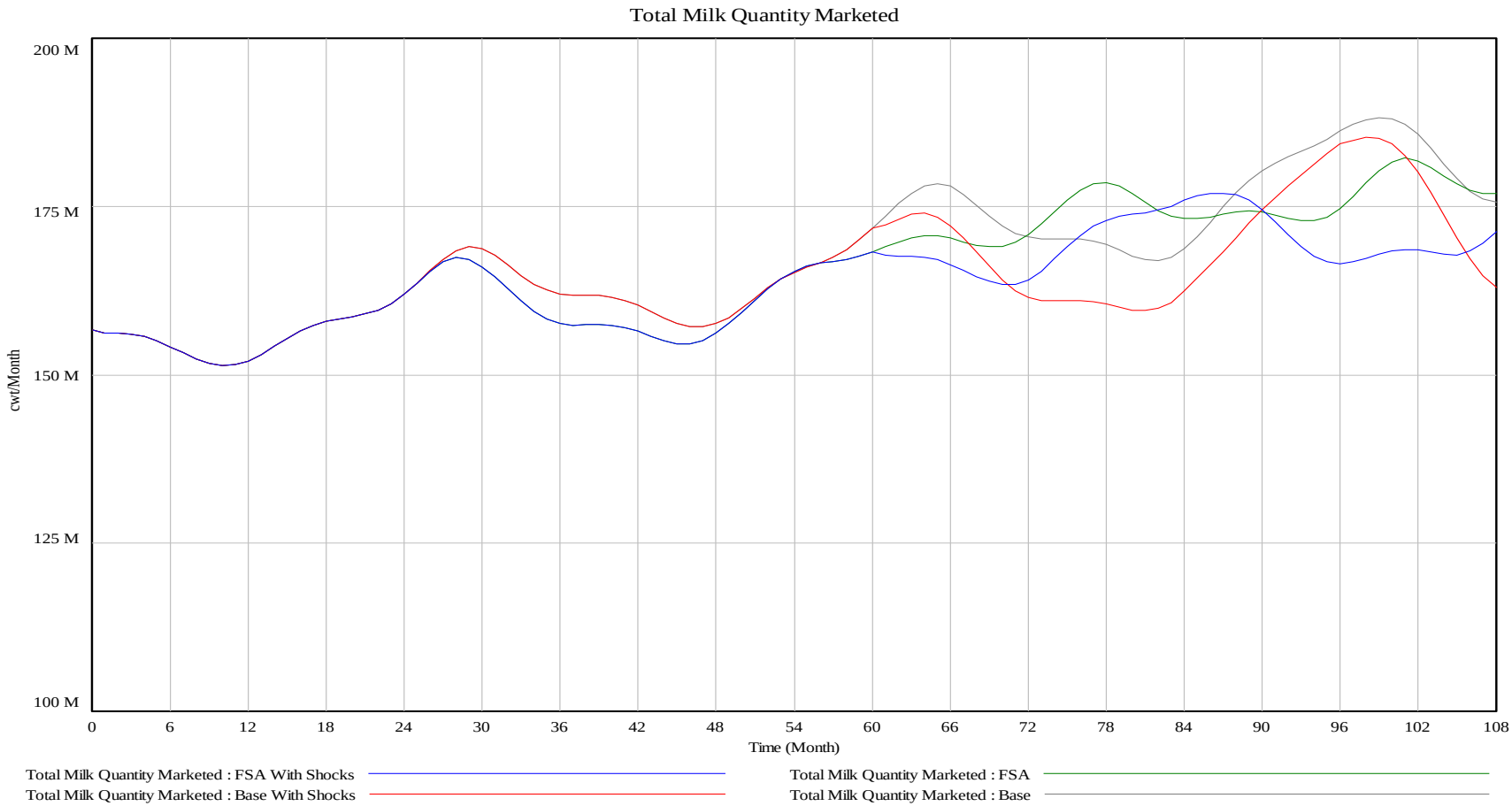

Figure 2. Quantity of milk (produced) and marketed from 2010 (time 0) to 2018 (time 108) for a Baseline scenario with and without shocks and with a Farm Savings Account assuming 75% contribution by dairy farmers in each of four size categories. Given these assumptions, the FSA reduces the increase milk production in response to significant shocks.

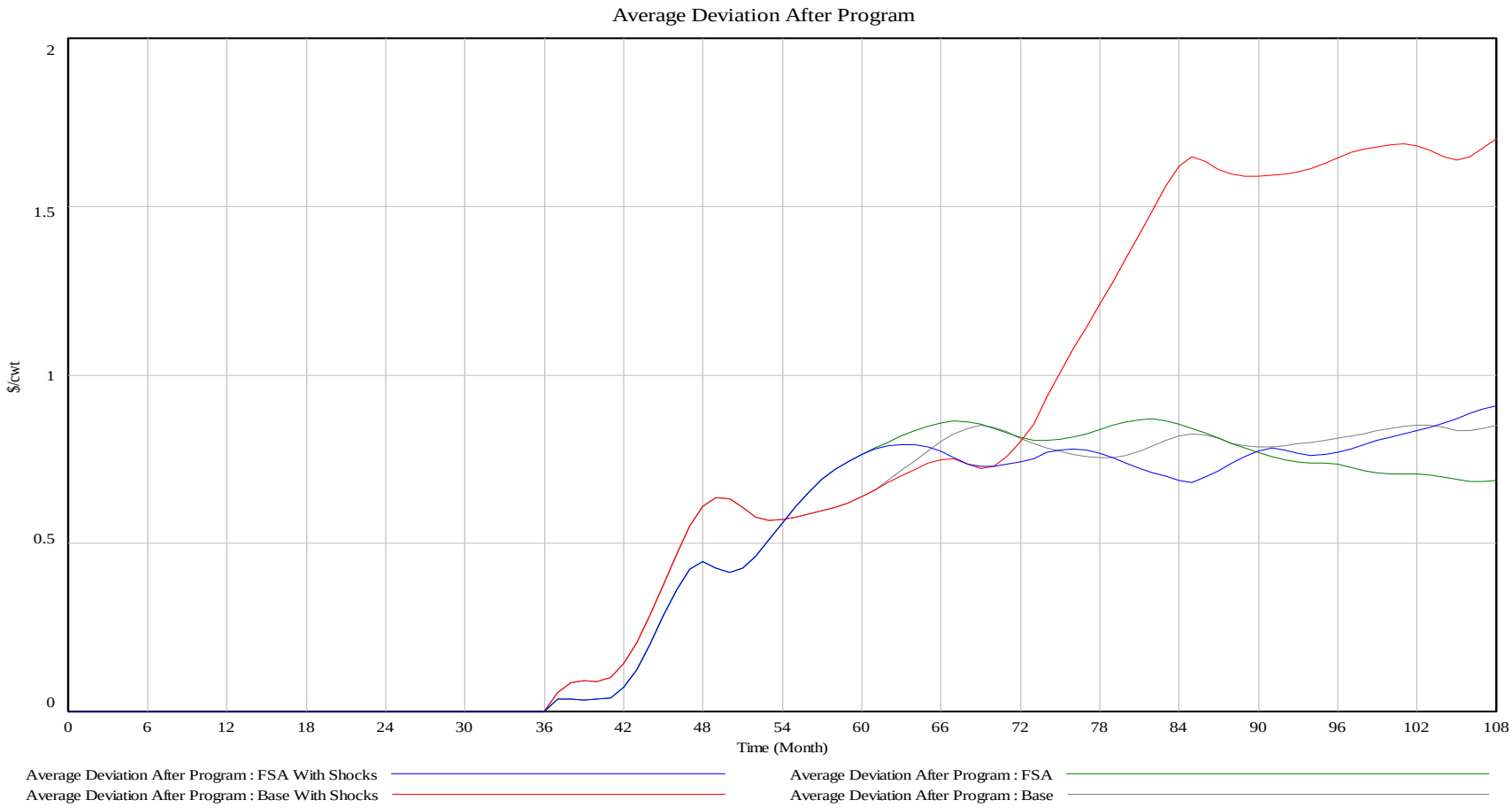

Figure 3. Average Absolute Deviation from the Mean All-Milk Price (a measure of variation) beginning in 2013 (one year after program implementation, time 36) through 2018 (time 108) for a Baseline scenario with and without shocks and with a Farm Savings Account assuming 75% contribution by dairy farmers in each of four size categories. The ending value of this variable is a measure of variation during project implementation. By this measure, the FSA reduces the variability in the All-Milk price. Variability is similar to that observed for other proposed programs (Costa-Sanders, Marginal Milk Pricing, Foundation for the Future) given shocks.

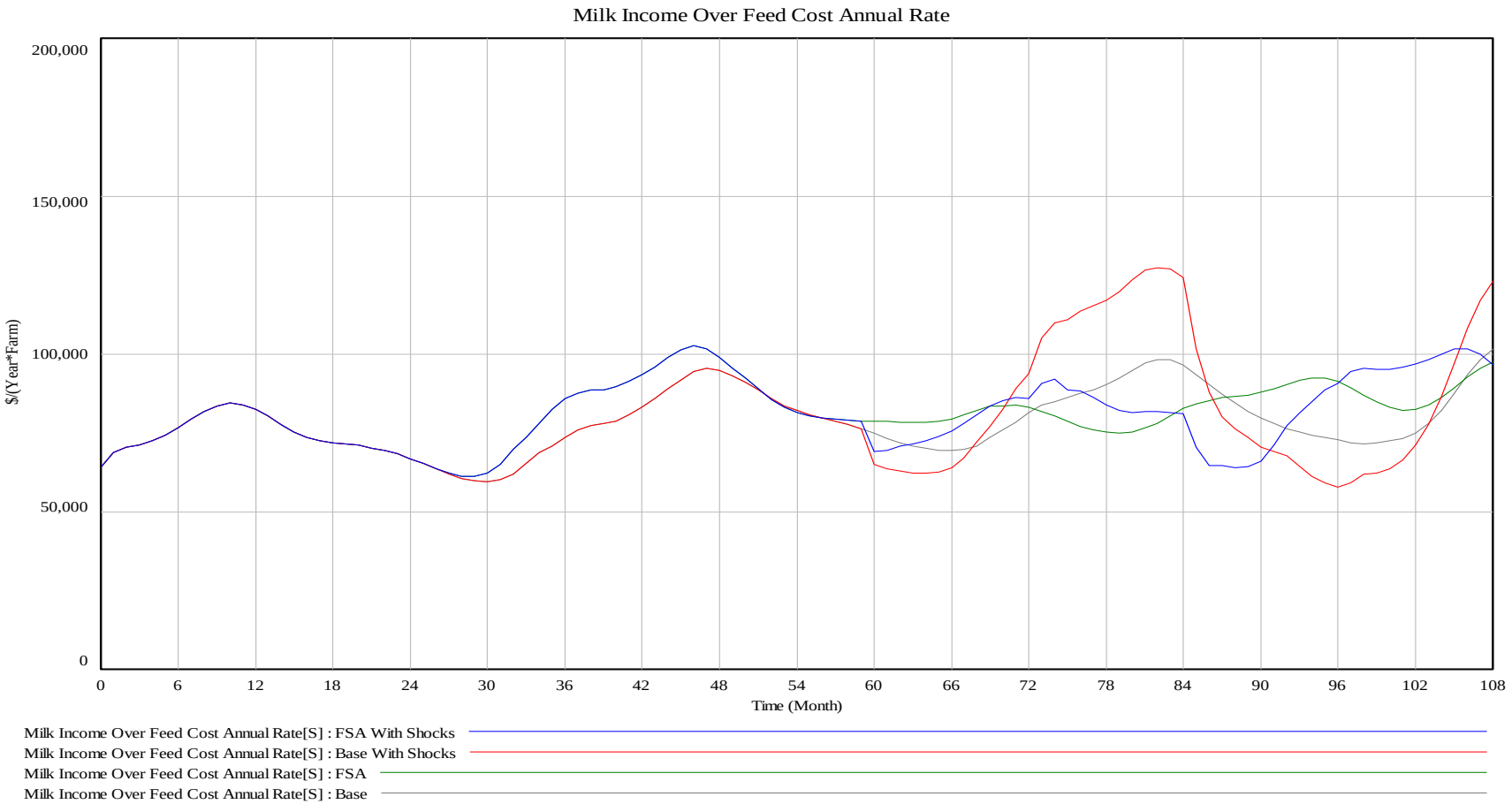

Figure 4. Milk Income Less Feed Costs for a small-size (37-cow) farm for a Baseline scenario with and without shocks and with a Farm Savings Account assuming 75% contribution by dairy farmers in each of four size categories. The FSA would tend to reduce variation in milk income less feed costs.

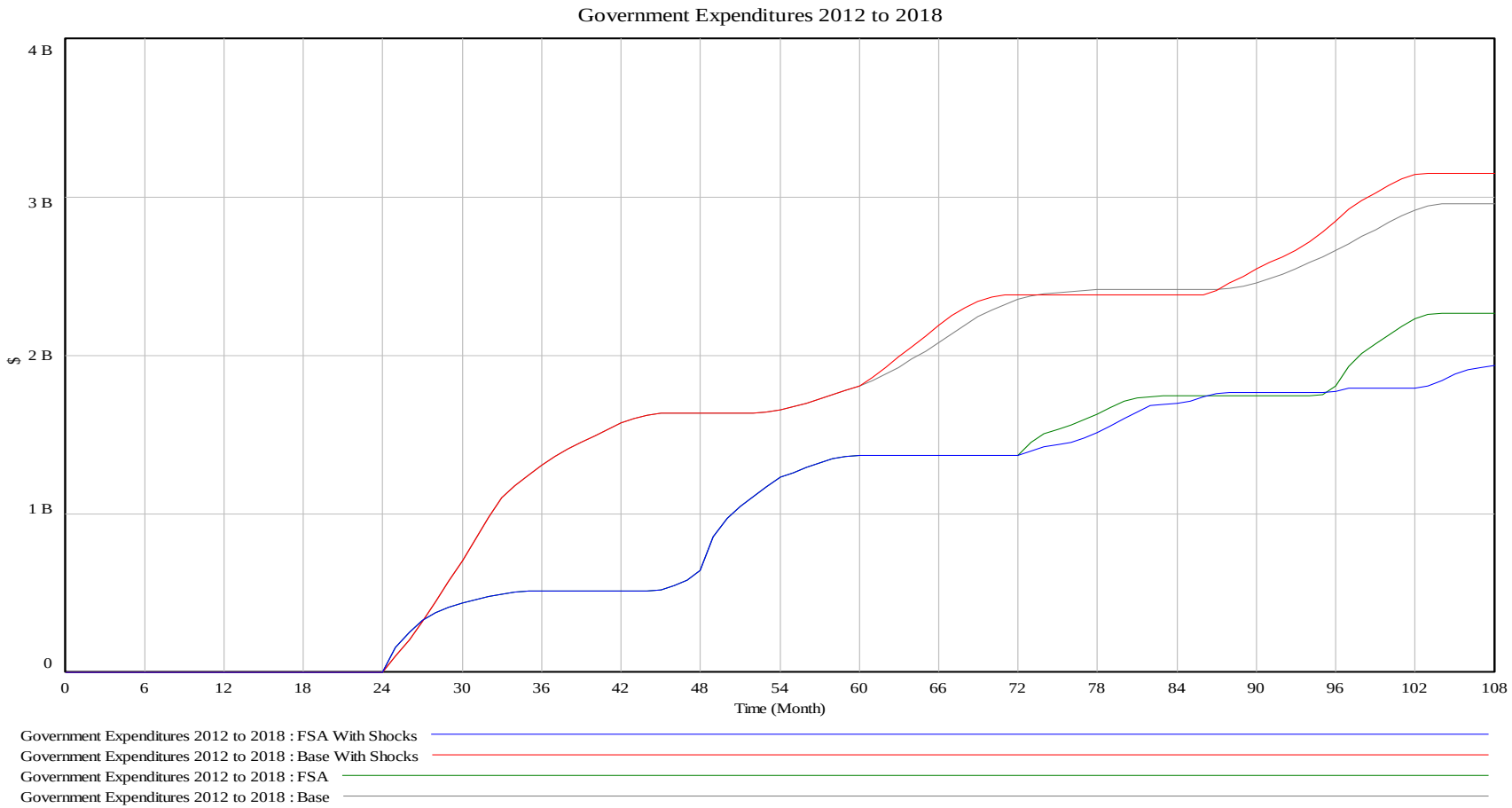

Figure 5. Cumulative government expenditures over time beginning in 2012 (time 24) through 2018 (time 108) for for a Baseline scenario with and without shocks and with a Farm Savings Account assuming 75% contribution by dairy farmers in each of four size categories. The FSA program would reduce projected government expenditures by about $1 billion over 7 years.

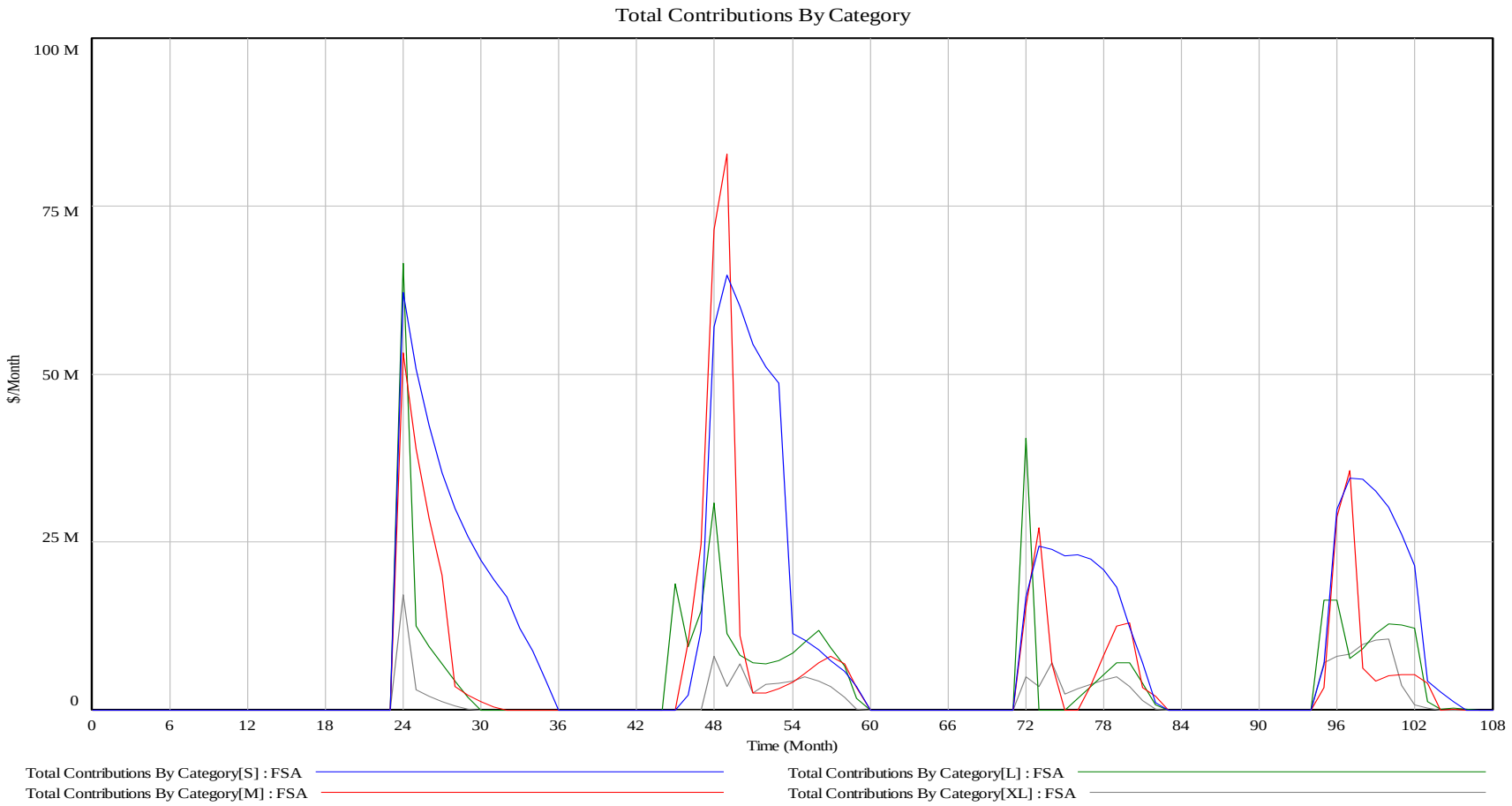

Figure 6. Total simulated government matching contributions to FSA during 2012-2018, by farm size category, for the scenario with no major shocks. Small and medium-size farms would receive the largest share of the total contributions (although not necessarily the largest per farm) under this scenario.

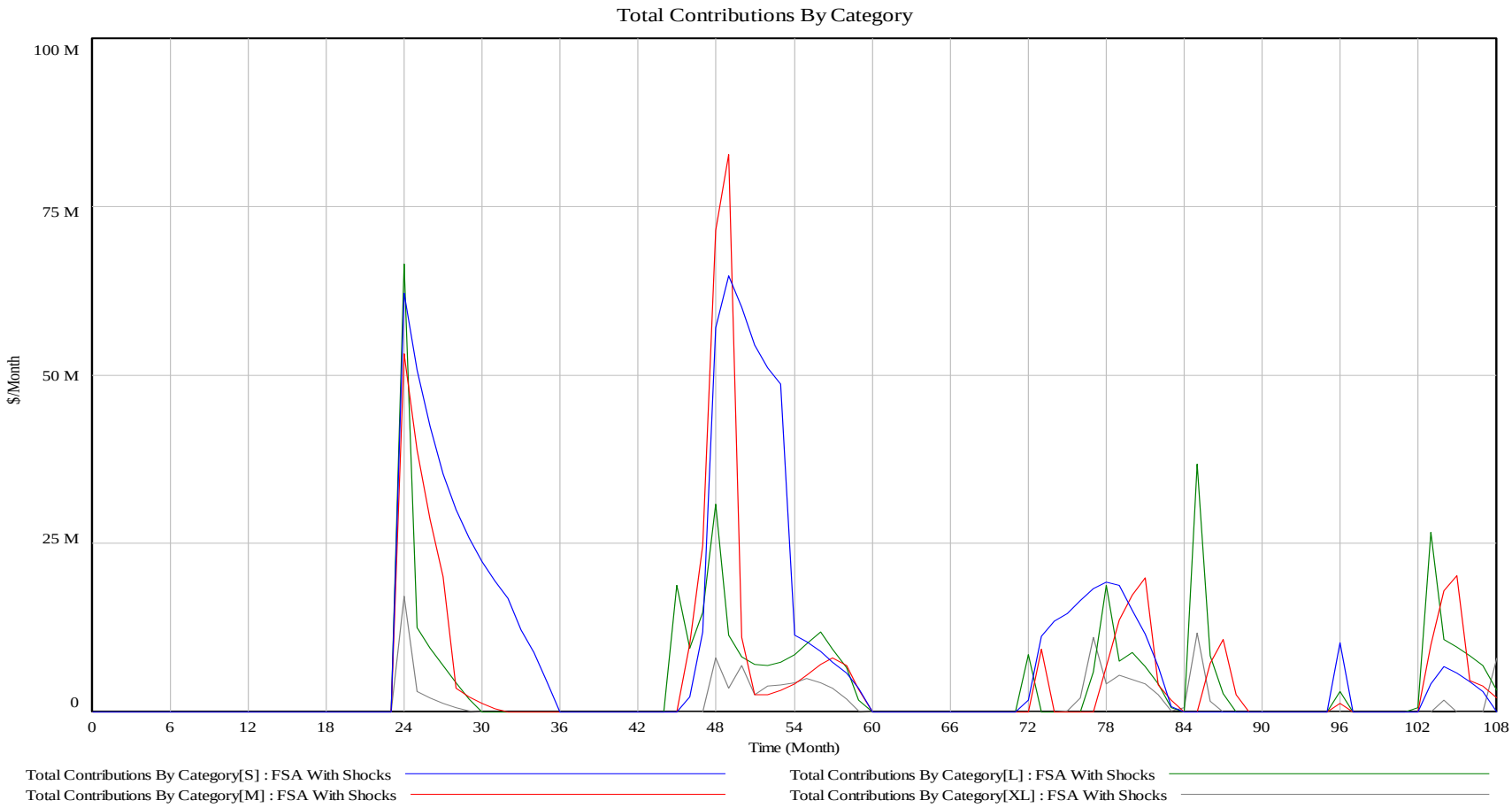

Figure 7. Total simulated government matching contributions to FSA during 2012-2018, by farm size category, for the scenario WITH major shocks. Small and medium-size farms would receive the largest share of the total contributions (although not necessarily the largest per farm) under this scenario.

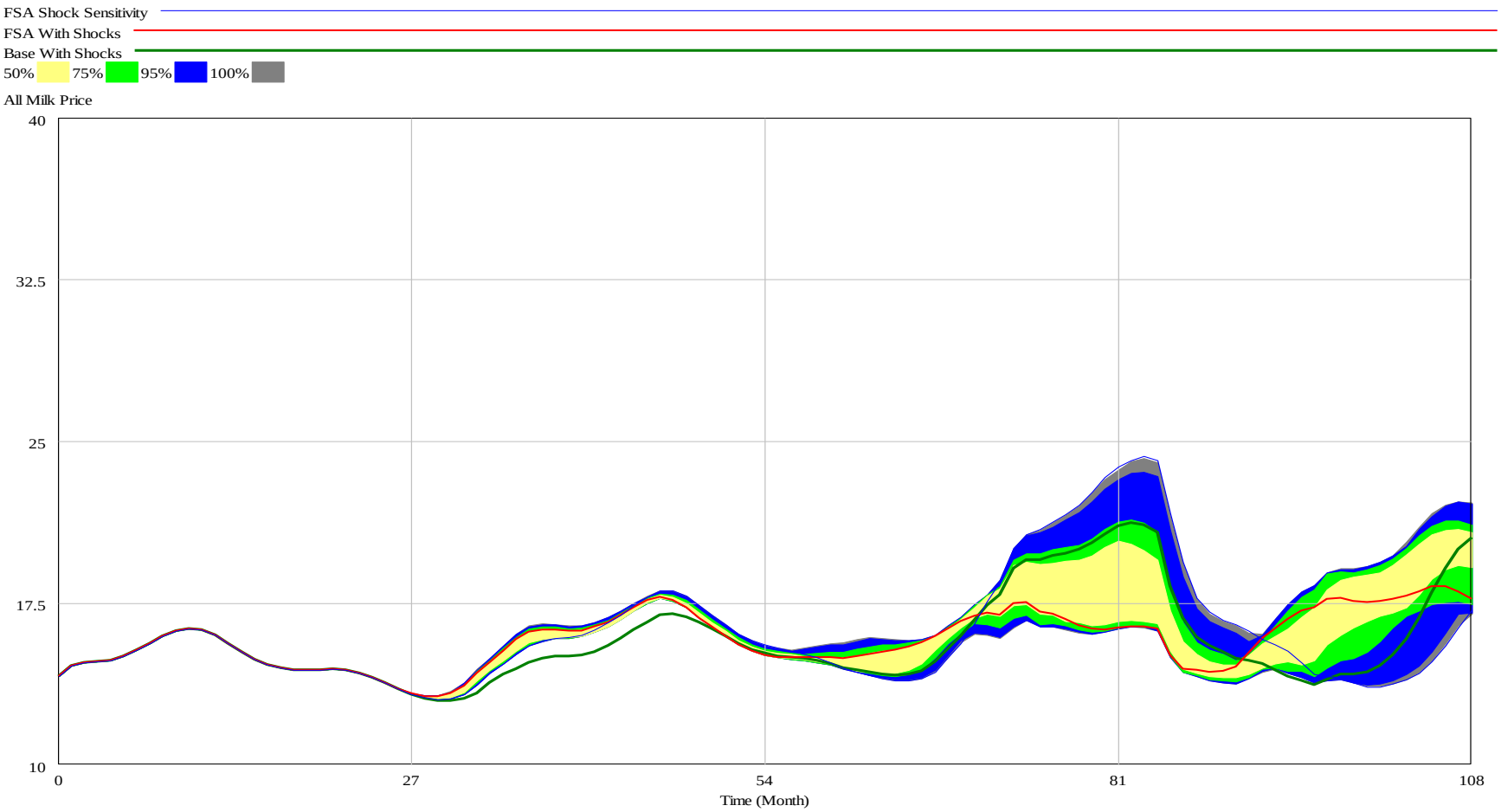

Figure 8. Sensitivity Analysis for the All-Milk price of the assumed value of the proportional contribution of farmers to FSA (Base=75%) for the scenario with major shocks. The yellow, green, blue and gray bands represent the distribution of All-Milk price values given random sampling of N=200 proportional contributions from 0 to 100%. The effectiveness of the program to reduce the price increase in response to major shocks is higher for a larger proportional contribution. Low values of proportional contribution have limited impact on movements of the All-Milk price.

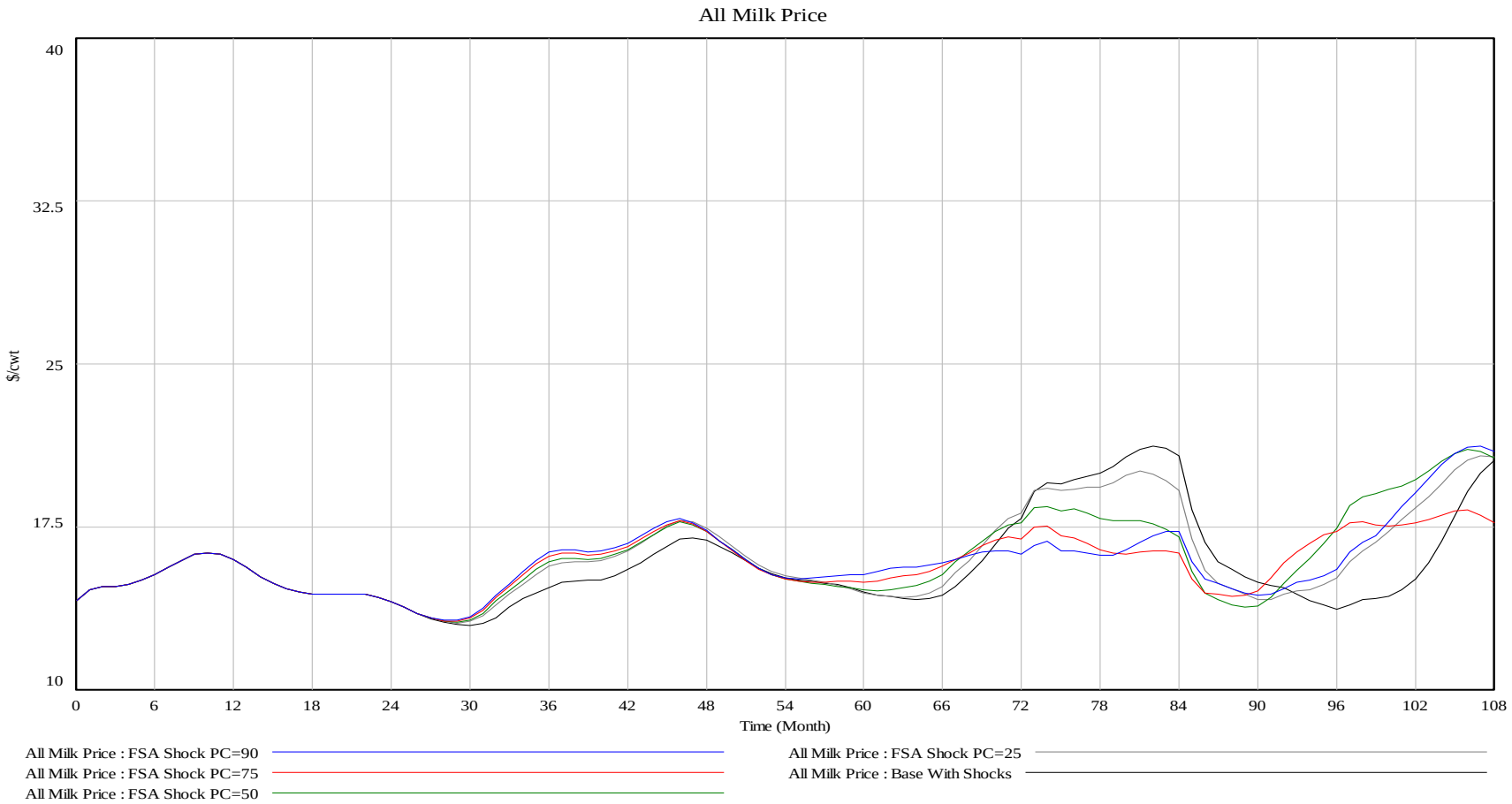

Figure 9. All-Milk price from 2010 to 2018 for the Baseline scenario with major shocks and four assumed proportional contribution rates (25%, 50%, 75% and 90%). This graph complements Figure 8 by indicating the pattern of change in the All-milk price as proportional contributions increase. As in Figure 8, larger proportional contributions have a larger impact on the All-Milk price pattern.

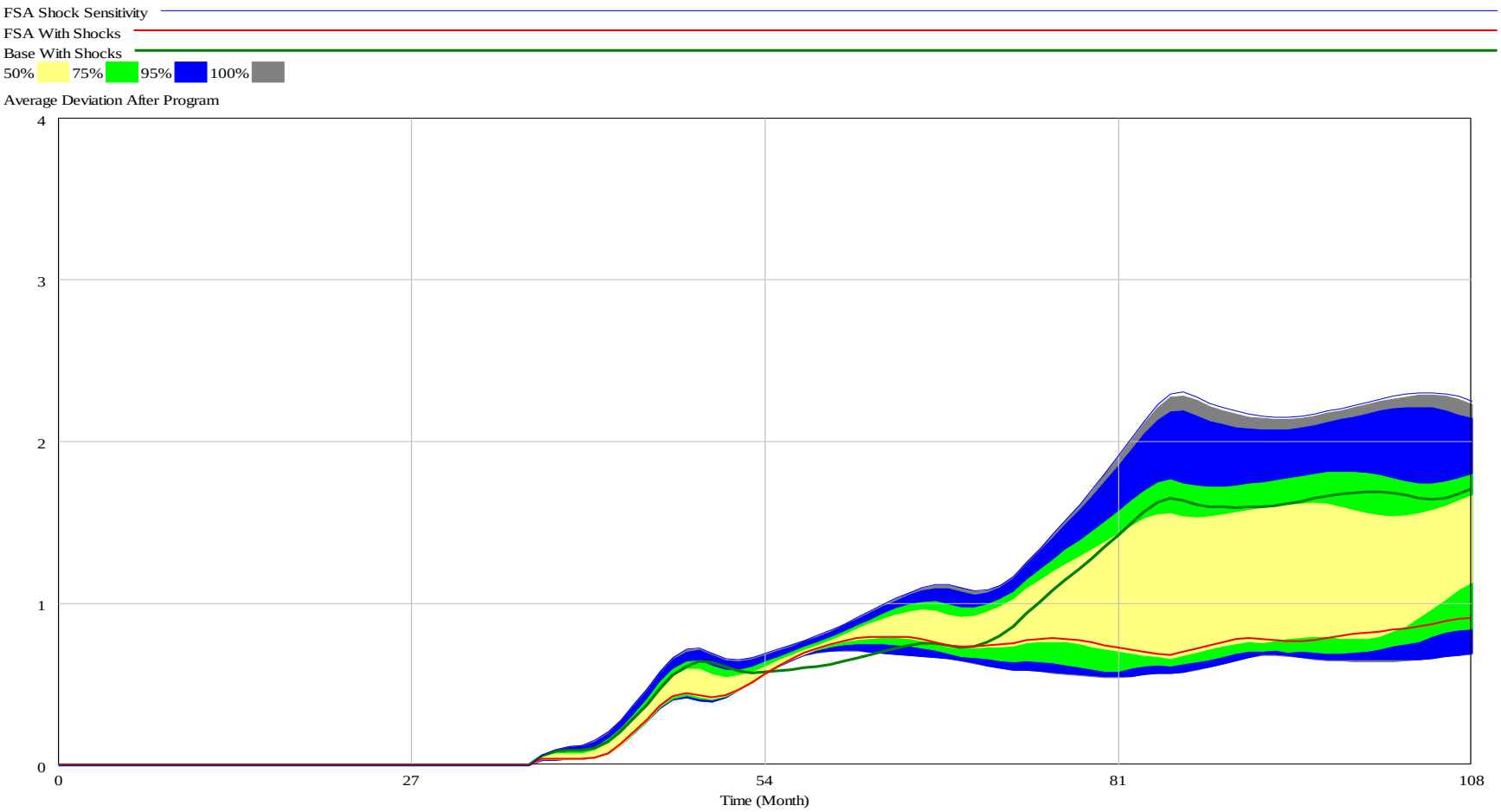

Figure 10. Sensitivity Analysis for the average absolute deviation in All-Milk price of the assumed value of the proportional contribution of farmers to FSA (Base=75%) for the scenario with major shocks. The yellow, green, blue and gray bands represent the distribution of variation in All-Milk price values given random sampling of N=200 proportional contributions from 0 to 100%. The effectiveness of the program to reduce variability in response to major shocks is higher for a larger proportional contribution. Low values of proportional contribution have more limited impact on All-Milk price variation.

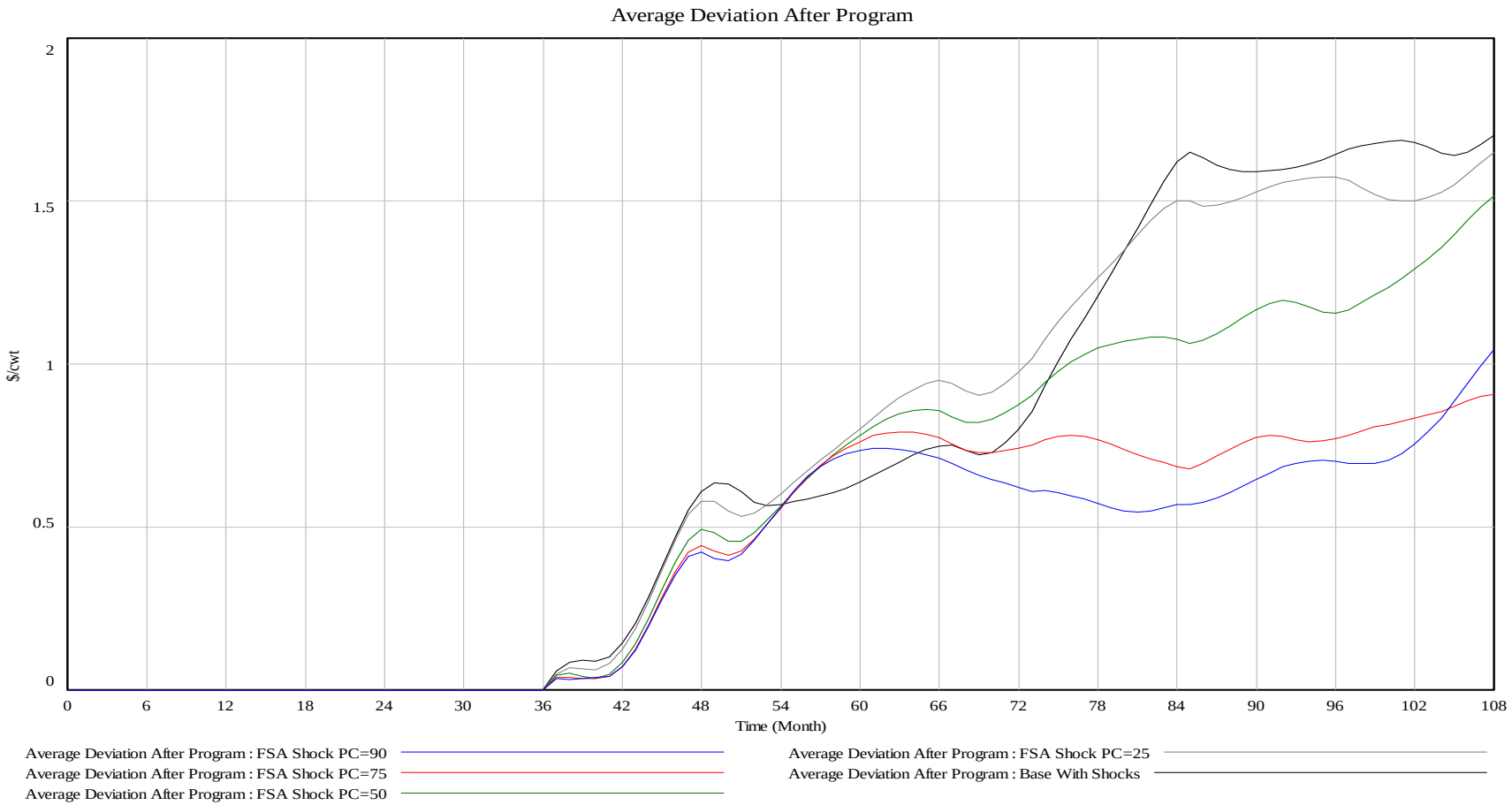

Figure 11. Average absolute deviation in All-Milk price from 2010 to 2018 for the Baseline scenario with major shocks and four assumed proportional contribution rates (25%, 50%, 75% and 90%). This graph complements Figure 10 by indicating the pattern of change in the variation of the All-milk price as proportional contributions increase. As in Figure 11, higher proportion contributions result in decreased variability.

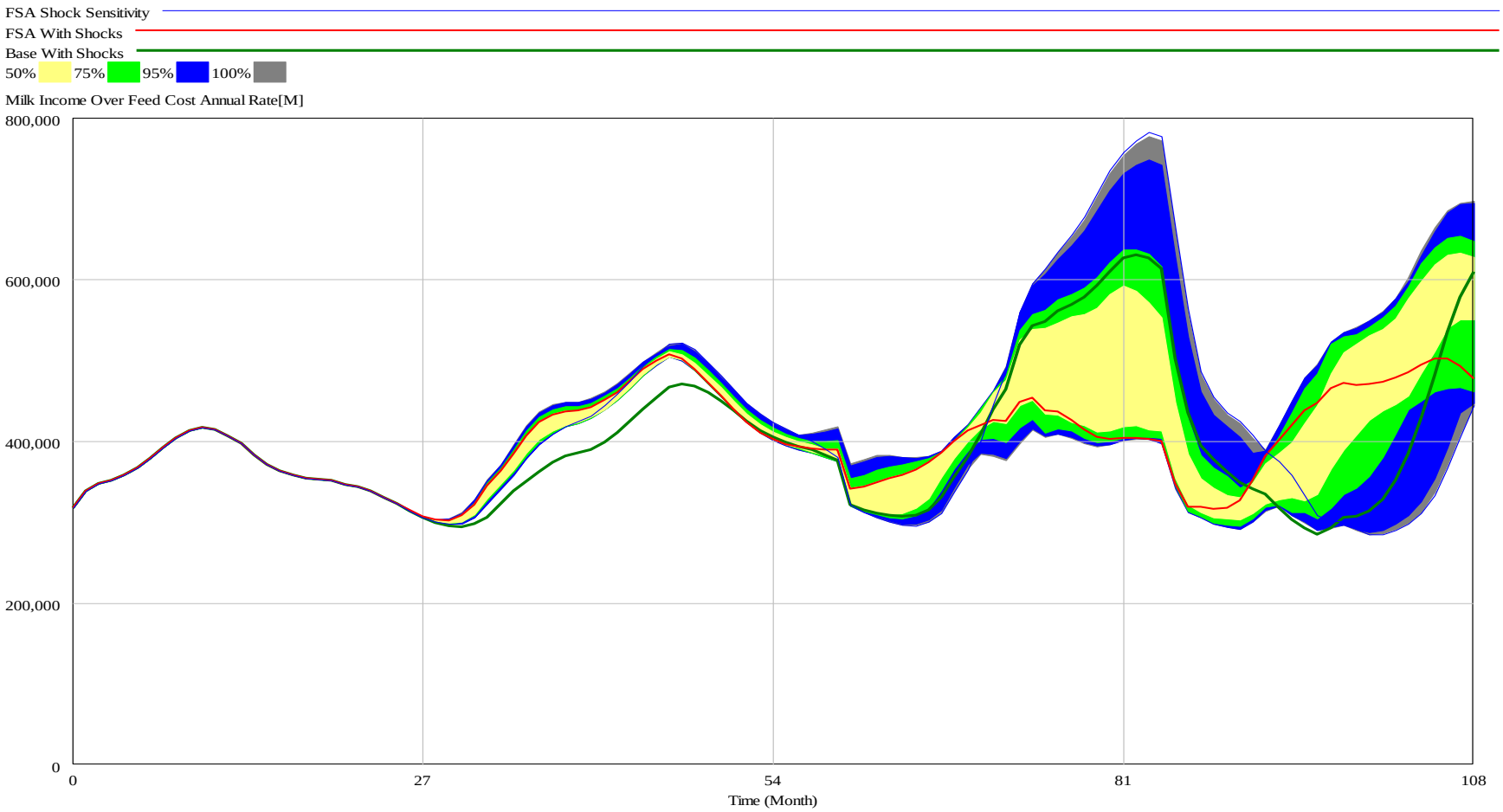

Figure 12. Sensitivity Analysis for the milk income less feed cost for a medium-size (183-cow) farm of the assumed value of the proportional contribution of farmers to FSA (Base=75%) for the scenario with major shocks. The yellow, green, blue and gray bands represent the distribution of milk income less feed cost values given random sampling of N=200 proportional contributions from 0 to 100%. The effectiveness of the program to reduce variability in milk income less feed costs in response to major shocks is higher for a larger proportional contribution. Low values of proportional contribution have more limited impact.

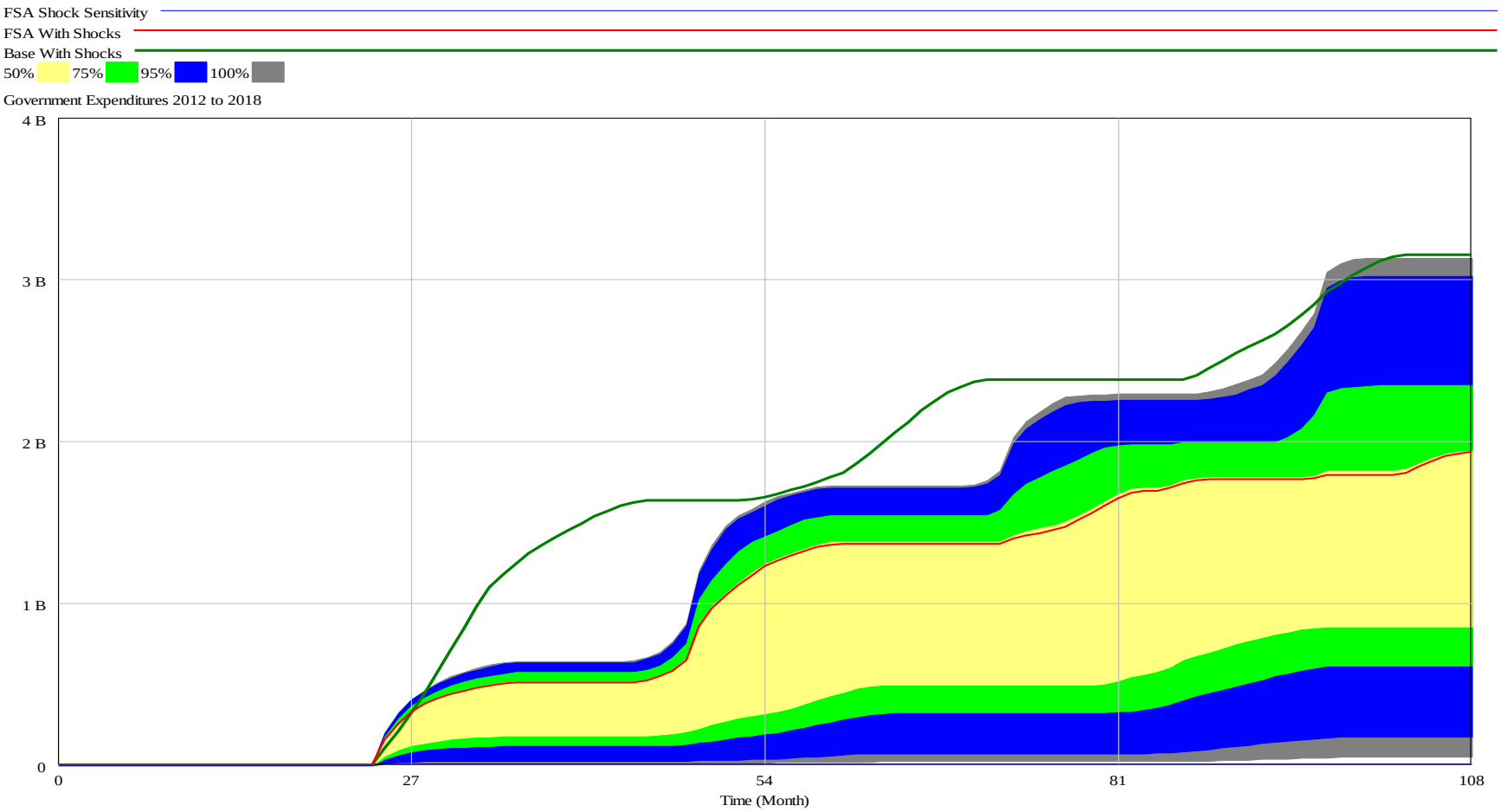

Figure 13. Sensitivity Analysis cumulative government expenditures from 2012 to 2018 of the assumed value of the proportional contribution of farmers to FSA (Base=75%) for the scenario with major shocks. The yellow, green, blue and gray bands represent the distribution of cumulative government expenditure values given random sampling of N=200 proportional contributions from 0 to 100%. Government expenditures increase for a larger proportional contribution by dairy farmers.

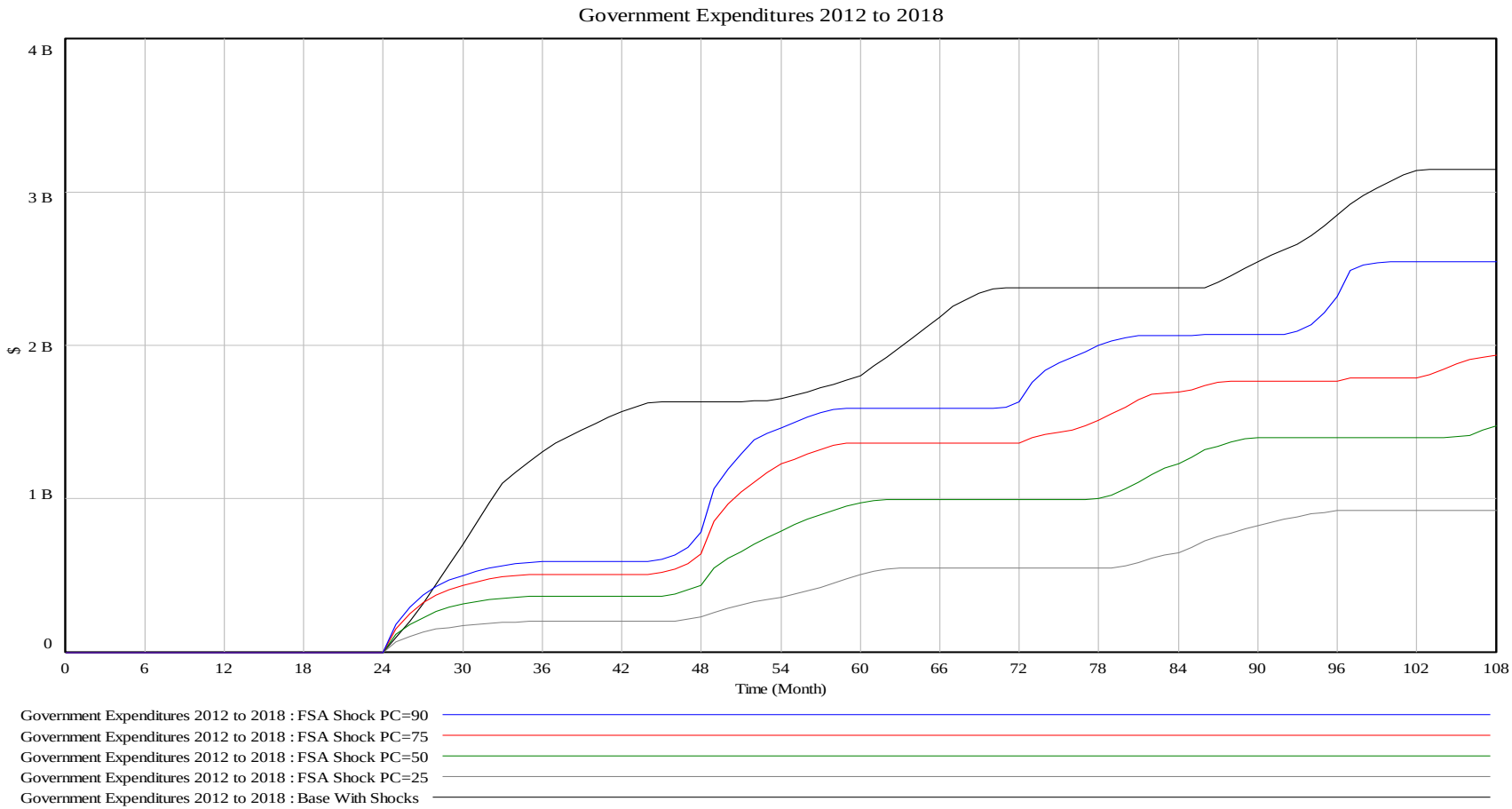

Figure 14. Cumulative government expenditures from 2012 to 2018 for the Baseline scenario with major shocks and four assumed proportional contribution rates (25%, 50%, 75% and 90%). This graph complements Figure 13 by indicating the pattern of change in the government expenditures as proportional contributions increase. As in Figure 13, higher proportion contributions increase expenditures.

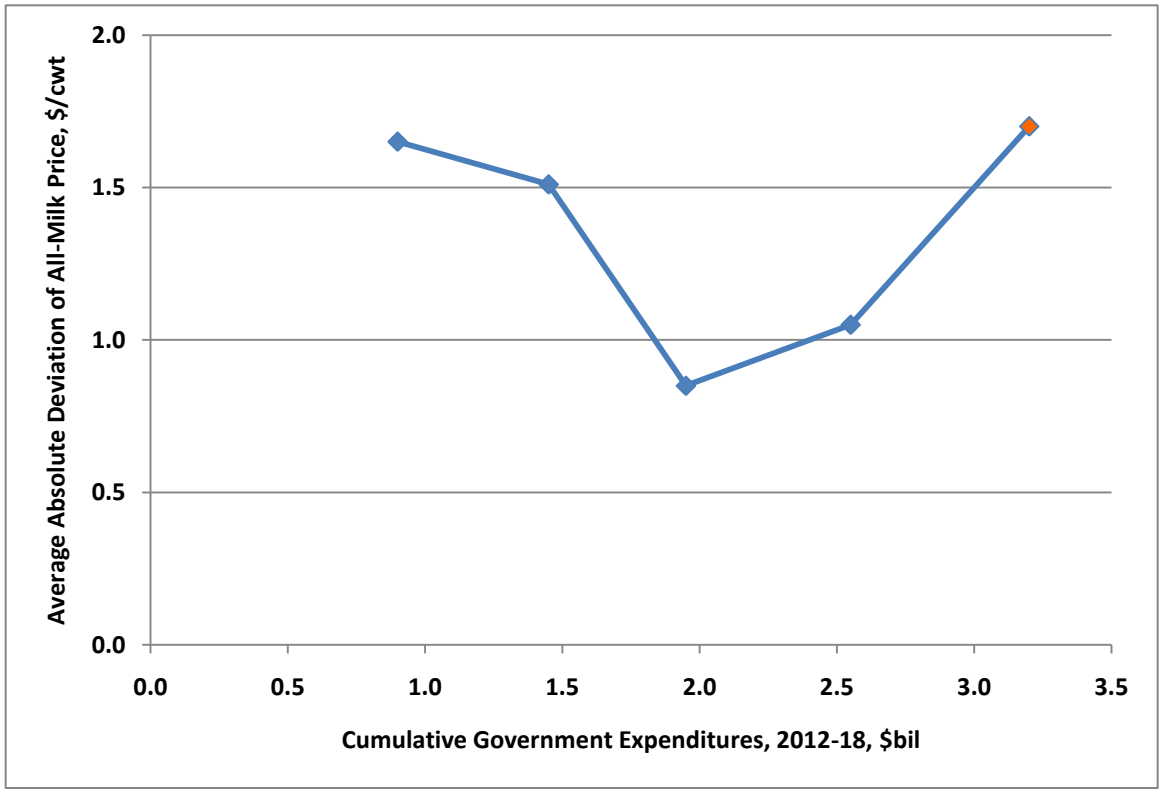

Figure 15. Simulated Relationship between variability in the All-Milk price (measured by average absolute deviation) and cumulative government expenditures with and FSA for the Baseline scenario with major shocks and four assumed proportional contribution rates (2%, 50%, 75% and 90%; proportional contribution values increase for points moving from left to right along the horizontal axis). The orange point indicates the Baseline expenditures with current programs but no FSA. Increases in government expenditures on FSA up to about $1.9 billion over 7 years will decrease variability in the All-Milk price.